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(71) 出願人 000003458

東芝機械株式会社

東京都中央区銀座4丁目2番11号

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(72) 発明者 鈴木 克之

静岡県沼津市大岡2068の3 東芝機械株式  
会社沼津事業所内

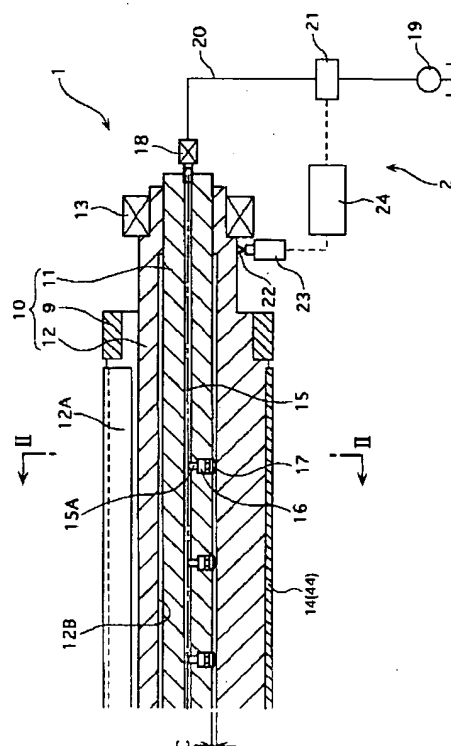
(74) 代理人 弁理士 木下 實三 (外1名)

(54) 【発明の名称】 印刷機のショックマーク防止装置

(57) 【要約】

【課題】 印刷胴に作用する力の変動をなくして振動を防いで印刷むらを防止し、印刷品質の向上を図れるようになる印刷機のショックマーク防止装置を提供する。

【解決手段】 印刷機のショックマーク防止装置1は、互いに所定の接触圧力で接触して逆回転する複数の印刷胴10の表面にクランプ溝12Aが形成され、これらの印刷胴10の回転に伴いクランプ溝12A同士が会合する際に生じる接触圧力の変動を抑制するもので、各印刷胴10の回転の周期に合わせてこれらの印刷胴10を各クランプ溝12Aの反対側に押圧する押圧手段2を備える。そのため、印刷胴10に作用する力が周期的に変動することがないので振動を防止し、振動に起因する印刷むらが減少し、印刷品質の向上を図れるようになる。



## 【特許請求の範囲】

【請求項1】 互いに所定の接触圧力で接触して逆回転する複数の印刷胴の表面に当該印刷胴の軸線と平行にそれぞれ版板またはゴムブランケットをクランプするためのクランプ溝が形成され、これらの印刷胴の回転に伴い前記クランプ溝同士が会合する際に生じる接触圧力の変動を抑制する印刷機のショックマーク防止装置であって、前記各印刷胴の回転の前記クランプ溝同士が会合する周期に合わせこれらの印刷胴を前記クランプ溝の反対側に押圧する押圧手段を備えていることを特徴とする印刷機のショックマーク防止装置。

【請求項2】 請求項1に記載の印刷機のショックマーク防止装置において、前記各印刷胴は、軸受けにより回転自在に支持され胴部とこの胴部の両端に当該胴部よりも小径に形成されたジャーナル部とからなる胴本体と、この胴本体の前記胴部の両端部に装着されたベアラと、前記胴本体の軸心に装着された反力バーとを備えて形成され、前記押圧手段は、前記胴本体内部に取り付けられるとともにこの胴本体を前記反力バーに対して外側に押圧するシリンダおよびピストンを含む流体アクチュエーターであることを特徴とする印刷機のショックマーク防止装置。

【請求項3】 請求項2に記載の印刷機のショックマーク防止装置において、前記流体アクチュエーターは、前記印刷胴の外部に設けられる油圧ポンプと、一端が回転継手を介して前記軸本体内部にその軸線に沿って開けられかつ前記シリンダに連通する油圧孔に接続されるとともに他端が前記油圧ポンプに接続される油圧配管と、この油圧配管の途中に設けられ前記油圧ポンプの圧油を前記シリンダに送出するサーボバルブと、前記各印刷胴の外部に設けられ前記印刷胴のクランプ溝の位置を検出しかつその信号を発信する検出器と、この検出器からの信号に基づいて前記油圧ポンプからの圧油を予め設定された押圧力と等しくなるように前記サーボバルブに指令を出す制御装置とを備えて構成されていることを特徴とする印刷機のショックマーク防止装置。

【請求項4】 請求項1に記載の印刷機のショックマーク防止装置において、前記各印刷胴は、軸受けにより回転自在に支持された胴本体と、この胴本体の胴部の両端部に装着されたベアラと、前記胴本体の軸心に装着された反力バーとを備えて形成され、前記押圧手段は、前記胴本体内部に取り付けられるとともにこの胴本体を前記反力バーに対して軸心側に吸引する磁極を含む電磁力アクチュエーターであることを特徴とする印刷機のショックマーク防止装置。

【請求項5】 請求項4に記載の印刷機のショックマーク防止装置において、前記電磁力アクチュエーターは、前記磁極の周囲に設けられたコイルと、一端が前記コイルに接続されるとともに他端側は前記軸本体内部にその軸線に沿って開けられた配線孔からスリップリングを介

して軸本体外部に延出される電線と、前記各印刷胴の外部に設けられ前記印刷胴のクランプ溝の位置を検出しかつその信号を発信する検出器と、この検出器からの信号に基づいて前記コイルに予め設定された吸引力と等しくなるような電磁力を発生させる制御装置とを備えて構成されていることを特徴とする印刷機のショックマーク防止装置。

【請求項6】 請求項1に記載の印刷機のショックマーク防止装置において、前記押圧手段は前記各印刷胴に外部から圧力を付加する外圧付加装置であることを特徴とする印刷機のショックマーク防止装置。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、オフセット印刷の印刷時に生じる印刷紙へのショックマークを防止する印刷機のショックマーク防止装置に関する。

【0002】

【背景技術】オフセット印刷における版胴およびゴム胴等の印刷胴には、その外周に金属平板の版材またはゴムブランケットが巻き付けられている。そして、これらのゴムブランケット等はその端部が各胴の軸線に沿って形成されたクランプ溝にクランプされて固定されている。従って、これらのクランプ溝は、互いに接している版胴とブランケット胴、またはブランケット胴とブランケット胴同士の接点で1回転ごとに会うようになっている。

【0003】

【発明が解決しようとする課題】ところで、印刷運転の際には、各胴が一定圧力で互いに押圧しながら接触回転している。そのため、印刷中に胴同士の接点にクランプ溝が位置しない状態では接触する胴間には接触圧力が作用しているが、接点においてクランプ溝が会う状態に至ると上記接触圧力が抜ける状態となる。つまり、印刷胴に作用する外力が周期的に変動することになる。この接触圧力抜けは、各胴のクランプ溝部の半径がわずかに沈み込んでいるために発生するもので、オフセット印刷においては必然的に生ずるものである。従って、印刷胴の1回転ごとに溝部同士が会うときのショックにより振動が発生し、この振動が印刷物にショックマークとして転写され、印刷された模様「むら」を生じさせるので、印刷物の絵柄に悪影響を与えて不良印刷の原因となり、印刷品質を低下させるものとなっている。

【0004】そこで、振動を低くおさえるために印刷胴の直径を大きくした印刷機（倍胴）も製作されているが、この場合、製作コストが高くなるという問題がある。また、各印刷胴の振動を減衰部材やダンパで低減する方法も提案されているが、振動に多くの周波数成分が含まれるため、異なる印刷速度に対し、常に振動を有効に減衰させるのは困難である。さらに、振動発生源のクランプ溝をなくすため、シームレス版やシームレスブラ

ンケットを使用する印刷機も提案されているが、版やブランケットの製作コストが高くなる上、印刷が進行するにつれブランケットが印刷胴に対して次第にずれてきて、印刷品質が低下するという問題がある。

【0005】本発明の目的は、印刷胴の周期的な振動の発生を抑制することにより印刷むらを減少させ、印刷品質の向上を図れるようになる印刷機のショックマーク防止装置を提供することにある。

【0006】

【課題を解決するための手段】本発明は、印刷胴の内部または外部に力を作用させる装置を設け、印刷胴の震動源である胴のクランプ溝同士における接触圧力の周期的な抜けが発生する周期に合わせて、抜けた接触圧力に相当する力を印刷胴に作用させて振動を低減させ、これにより、印刷むらを減少させ印刷品質の向上を図ろうとするものである。

【0007】具体的には、本発明に係る請求項1に記載の印刷機のショックマーク防止装置は、互いに所定の接触圧力で接触して逆回転する複数の印刷胴の表面に当該印刷胴の軸線と平行にそれぞれ版板またはゴムブランケットをクランプするためのクランプ溝が形成され、これらの印刷胴の回転に伴い前記クランプ溝同士が会合する際に生じる接触圧力の変動を抑制する印刷機のショックマーク防止装置であって、各印刷胴の回転のクランプ溝同士が会合する周期に合わせてこれらの印刷胴をクランプ溝の反対側に押圧する押圧手段を備えていることを特徴とするものである。

【0008】以上において、印刷胴は、版胴、ゴム胴等をいい、また、押圧手段としては、印刷胴を溝の反対側に押圧するものであればどのような形式でもよく、油圧式、空圧式、電気式等限定されない。さらに、押圧力は、クランプ溝会合状態の際における反力バーによる力と印刷胴の接触圧力による力の合計が、クランプ溝会合状態以外の通常の接触状態の場合に印刷胴に働く力とほぼ同一となるような強さであることが好ましい。また、押圧手段は、反力バーを挟んでクランプ溝の180度反対側であることが好ましい。

【0009】このような本発明では、各印刷胴はそれぞれのクランプ溝が会合する際に、押圧手段でクランプ溝の反対側を押圧するので、クランプ溝同士の接点において低減する接触圧を補償して、クランプ溝会合状態の際における反力バーによる力と印刷胴の接触圧力による力の合計を、クランプ溝会合状態以外の通常の接触状態の場合に印刷胴に働く力と同一となるようにすることができる。従って、印刷胴の接触圧の変動がなくなり振動の発生が抑制されて印刷むらが減少するため、印刷品質の向上を図れるようになる。

【0010】本発明に係る請求項2に記載の印刷機のショックマーク防止装置は、請求項1に記載の各印刷胴を、軸受けにより回転自在に支持され胴部とこの胴部の

両端に当該胴部よりも小径に形成されたジャーナル部とからなる胴本体と、この胴本体の前記胴部の両端部に装着されたベアラと、胴本体の軸心に装着された反力バーとを備えて形成し、押圧手段は、胴本体内部に取り付けられるとともにこの胴本体を反力バーに対して外側に押圧するシリンダおよびピストンを含む流体アクチュエーターであることを特徴とするものである。このような本発明では、流体アクチュエーターにより正確にかつ容易に制御し、クランプ溝が会合する際にクランプ溝の反対側を押圧するので、印刷胴の振動が抑制されて印刷むらが減少し、これにより、印刷品質の向上を図れるようになる。

【0011】本発明に係る請求項3記載の印刷機のショックマーク防止装置は、請求項2に記載の流体アクチュエーターを、印刷胴の外部に設けられる油圧ポンプと、一端が回転継手を介して軸本体内部にその軸線に沿って開けられかつシリンダに連通する油圧孔に接続されるとともに他端が油圧ポンプに接続される油圧配管と、この油圧配管の途中に設けられ油圧ポンプの圧油をシリンダに送出するサーボバルブと、各印刷胴の外部に設けられ印刷胴のクランプ溝の位置を検出しかつその信号を発信する検出器と、この検出器からの信号に基づいて油圧ポンプからの圧油を予め設定された押圧力と等しくなるようにサーボバルブに指令を出す制御装置とを備えて構成したことを特徴とするものである。このような本発明では、流体アクチュエーターにより正確にかつ容易に制御し、クランプ溝が会合する際に胴本体をクランプ溝の反対側を押圧するので、印刷胴の振動の変動が抑制されて印刷むらが減少し、これにより、印刷品質の向上を図れるようになる。

【0012】本発明に係る請求項4記載の印刷機のショックマーク防止装置は、請求項1に記載の各印刷胴を、軸受けにより回転自在に支持された胴本体と、この胴本体の胴部の両端部に装着されたベアラと、胴本体の軸心に装着された反力バーとを備えて形成し、押圧手段は、胴本体内部に取り付けられるとともにこの胴本体を前記反力バーに対して軸心側に吸引する磁極を含む電磁力アクチュエーターであることを特徴とするものである。このような本発明では、電磁力アクチュエーターにより正確にかつ容易に制御し、クランプ溝が会合する際に胴本体をクランプ溝の反対方向に吸引するので、印刷胴の振動が抑制されて印刷むらが減少し、これにより、簡単な構成で、印刷品質の向上を図れるようになる。

【0013】本発明に係る請求項5記載の印刷機のショックマーク防止装置は、請求項4に記載の電磁力アクチュエーターを、磁極の周囲に設けられたコイルと、一端がコイルに接続されるとともに他端側は軸本体内部にその軸線に沿って明けられた配線孔からスリップリングを介して軸本体外部に延出される電線と、各印刷胴の外部に設けられ印刷胴のクランプ溝の位置を検出しかつその

信号を発信する検出器と、この検出器からの信号に基づいてコイルに予め設定された吸引力と等しくなるような電磁力を発生させる制御装置とを備えて構成したことを特徴とするものである。このような本発明では、電磁力アクチュエーターにより正確にかつ容易に制御し、クランプ溝が会合する際に胴本体をクランプ溝の反対方向に吸引するので、印刷胴の振動が抑制されて印刷むらが減少し、これにより、簡単な構成で、印刷品質の向上を図れるようになる。

【0014】本発明に係る請求項6記載の印刷機のショックマーク防止装置は、請求項1に記載の印刷機のショックマーク防止装置において、押圧手段を、各印刷胴に外部から圧力を付加する外圧付加装置としたことを特徴とするものである。以上において、外圧付加装置としては、エアー吹き付け装置や電磁石等の非接触アクチュエーターにより印刷胴表面の印刷パターンに影響を与えないようにするものが好ましく、また、印刷胴の配列により、必ずしも180度反対側に押圧することができないような場合、多少ずれた方向に押圧して胴に作用する力の変動を防ぎ、振動を抑制するようにしてもよい。この

【0015】

【発明の実施の形態】以下に、本発明の実施形態を図面に基づいて説明する。図1～3に示すように、本発明の第1実施形態の印刷機のショックマーク防止装置1は、流体アクチュエーターを使用した押圧手段2により印刷胴をクランプ溝12Aの反対側に押圧するものである。

【0016】まず本実施形態の印刷胴10について述べる。印刷胴10は、胴部とこの胴部の両端に当該胴部よりも小径に形成されたジャーナル部からなる胴本体12と、この胴本体12の胴部の両端に装着されたベアラ9と、胴本体12の中心に挿着された反力バー11とを含んで形成されており、このような印刷胴10の胴部の外周にブランケット14または刷判44が巻着されている。前記ジャーナル部は小径の段付き状に形成され、そのジャーナル部の最小径の部位が軸受け13により支持されている。従って、印刷胴10は回転自在となっている。

【0017】また、胴本体12の内部かつ端部から内側に所定寸法入り込んだ部位間には、反力バー11の外形寸法より大きな内径寸法の孔12Bが明けられており、これにより、反力バー11と胴本体12の内径との間には所定寸法の隙間Cが設けられていることになる。胴本体12の外周には、その軸線に沿って1条のクランプ溝12Aが形成されており、このクランプ溝12Aにゴムブランケット14または刷判44の端部がクランプされ固定されるようになっている。

【0018】反力バー11の軸線方向中心には反力バー

11の全長にわたって油圧孔15が明けられている。また、反力バー11の内部には、その軸線と直交するとともに、クランプ溝12Aのほぼ180度反対側にシリンダ16が設けられ、このシリンダ16は、反力バー11の軸線と直交方向に出入り自在となったピストン17を有している。また、反力バー11の長さ方向に所定間隔で複数個配置されている。そして、これらのシリンダ16と上記油圧孔15とは、それぞれ連結孔15Aで連結されている。ここで、シリンダ16のピストン17が出たとき、その先端は胴本体12の内径12Bと当接し、かつ、胴本体12を反力バー11に対してクランプ溝12Aの180度外側に押圧できるようになっている。

【0019】反力バー11の端面には回転継手18が取り付けられており、この回転継手18には、他端が油圧ポンプ19に接続された油圧配管20の一端が接続されている。また、この油圧配管20の途中には油圧ポンプ19からの圧油をシリンダ16に供給するサーボバルブ21が配置されている。胴本体12の外周には、クランプ溝12Aの例えば180度反対側に固定されてドグ22が設けられ、一方、図示しないフレームには、このドグ22の位置を検出する検出器23が設けられている。そして、この検出器23は、図3に示すように、互いに接する印刷胴（ゴムブランケット14が装着されたゴム胴）10A、10A、または印刷胴10Aと10B（刷判44が装着された版胴）同士のクランプ溝12Aが接点において会合するタイミングで信号を出すようになっている。

【0020】また、印刷胴10の外周には制御装置24が設けられ、この制御装置24は、検出器23からのクランプ溝会合の信号を受けると、接触圧力の抜ける分を補償する圧油をシリンダ16に供給するようにサーボバルブ21に指令を出すようになっている。なお、実測等の手段により求められる接触圧力の抜ける分の力は予め設定されている。そして、ここにおいて、油圧孔15から制御装置24に至る一連の続きの符号で表す各部材を含んで、前記流体アクチュエーター2が構成され、この流体アクチュエーター2が前記押圧手段となっている。

【0021】次に、図3に基づいて、このような印刷胴10を連続印刷用紙であるウェブWを挟んで上下に2つずつ配置して両面印刷用とした際の、各印刷胴10間に作用する力関係を説明する。ウェブWを挟んで上下に印刷胴のゴム胴10A、10Aが互いに所定の接触圧力で接触して配置され、それぞれのゴム胴10A、10Aには版胴10B、10Bが互いに所定の接触圧力で接触して配置されている。従って、互いに接する印刷胴10A、10A間および10A、10B間には、その接点において接触圧力が一方の胴を相手胴から離反させる方向に作用している。

【0022】すなわち、2つの印刷胴10A、10A等が押し合って回転しているとき、互いの胴10Aは相手

側から押されて胴の全長にわたって荷重を受けて撓んだ状態となっている。この撓み量は、胴経、胴の長さ、および胴のジャーナル部の直径と胴圧（胴同士の押付け圧）により決まるが、おおよそ数mm/100程度となっている。

【0023】接点にクランプ溝12A同士が会合する回転角度に至ると、クランプ溝12Aの部位は半径がわずかに沈み込んでいるため、接触圧力の抜けが生じて接触圧力は低減し、毎回転の溝会合の際に撓み量が変動（減少）してしまう。しかし、このとき、検出器23からのクランプ溝会合信号により反力バー11に設けられたシリンドラ16のピストン17が、胴本体12をクランプ溝12Aの180度反対側に押圧し、接触圧力が低減した分だけの力を各印刷胴10A、10Aに作用させ、これにより、印刷胴10A、10Aに作用する力の合計はクランプ溝会合状態でも他の状態、すなわち、クランプ溝12A同士が会合していないときの状態と同じとなるようにする。従って、印刷胴10A、10Aに作用する力が周期的に変動することがなくなり、これにより、振動の変動を抑制でき、振動に起因する印刷むらを防止することができるようになっている。

【0024】なお、印刷胴の版胴10Bの胴部42には版板44が装着されており、この版板44の端部はクランプ溝42Aにクランプ、固定されている。また、この版胴10Bにもシリンドラ等を含む押圧手段を設けてもよい。

【0025】このような本実施形態によれば、次のような効果がある。

①クランプ溝12Aの会合状態においては、反力バー11による力と印刷胴10同士の接触圧による力の合計が、溝12Aの会合状態以外の通常の接触状態の場合に印刷胴10に働く力と同一となり、結果として、1回転中に印刷胴に作用する力は常に変動しないこととなる。従って、印刷胴10の振動の変動が抑制されて印刷むらがなくなるため、ショックマークの発生を防止でき、これにより、印刷品質の向上を図れるようになる。

【0026】②胴本体12のジャーナル部の外周にはドグ22が設けられ、一方、印刷機のフレームにはこのドグ22の位置を検出する検出器23が設けられ、この検出器23からのクランプ溝検出の信号を受けて制御装置24でシリンドラ16に適量の圧油を供給するようになっているので、正確に胴本体12に力を作用させることができる。

③胴本体12の内部に設けられるシリンドラ16は、胴本体12の長手方向に所定間隔で複数あるので、胴本体12を反力バー11に対して均等に押圧でき、これにより、印刷胴10に作用する力が変動することがないので振動を防ぎ、印刷むらがなくなるため、印刷品質の向上を図れるようになる。

【0027】図4～6には本発明の第2実施形態が示さ

れており、この実施形態の印刷機のショックマーク防止装置1'は、前記第1実施形態の押圧手段2が流体アクチュエーターを利用したものであるのに対し、電磁力アクチュエーターを利用した押圧手段2'で胴本体12を反力バー11に対してクランプ溝12Aの反対側に押圧（吸引）するものである。従って、この実施形態においては、前記第1実施形態と異なる部分のみを説明し、第1実施形態と同様の構造、部材等には、同一符号を付すとともに、詳細な説明は省略または簡略化する。

【0028】反力バー11の内部には、その軸線に沿って配線孔15'が明けられ、また、前記シリンドラ16に代えて磁極30およびコイル31が設けられている。この磁極30およびコイル31は、配線孔15'と直交し、かつ、クランプ溝12Aと同じ側に配置され、磁極30は胴本体12の内径12Bと隙間を明けて対向している。

【0029】配線孔15'内には、一端が上記コイル31に接続し他端が制御装置24'に接続する電線32が挿通され、この電線32とコイル31とは連結線32Aで連結されている。反力バー11の端部にはスリップリング33が設けられている。制御装置24'は、検出器23からクランプ溝会合の信号を受けると、予め設定された接触圧力補償パターンの電磁力を発生させる電流をコイル31に出力するようになっている。従って、電流をコイル31に出力することにより、磁極30が作動して胴本体12のクランプ溝12A側を反力バー11側に吸引し、これにより、クランプ溝12A同士の会合時に接触圧力が低減した分だけの力を補償し、印刷胴に作用する力の変動を防ぎ、振動の発生を抑制している。

【0030】このような電磁力アクチュエーターを利用したショックマーク防止装置1'付きの印刷胴10を、図6に示すように配置したとき、前記第1実施形態と同様の力の作用が各胴10A、10A間等に働く。ただし、第1実施形態では胴本体12を反力バー11に対して押圧しており、本第2実施形態では胴本体12を反力バー11側に吸引した点の違いはあるが、結果的にはクランプ溝12Aの反対側に力を作用させることになり、効果も同じようなものとなる。そして、このような本実施形態では、前記①～③と同様の作用効果を得ることができる。

【0031】なお、本発明は前記各実施形態に限定されるものではなく、本発明の目的を達成できるものであれば、次のような変形形態を含むものである。すなわち、前記各実施形態では、押圧手段2、2'を反力バー11の内部に設けたシリンドラ16、磁極30等を含むものとしたが、これに限らず、図7に示すように、印刷胴10A、10Aの外部から非接触式アクチュエーターにより力を加えてもよい。

【0032】図7の例では、2つの印刷胴10A、10Aと10A、10Bとが接触しているとき、クランプ溝

のない印刷胴10Bとクランプ溝12Aのある印刷胴10A同士は常に一定の押圧で接触しており、印刷胴10A、10Aに作用する力の変動はベアラのある胴のクランプ溝12Aにより生じる。従って、溝会合時に押圧力の変動分(減少分)にほぼ相当する力を胴本体12の胴部またはベアラに与えて、結果として、胴の撓み量が変わ動しないようにしたものである。

【0033】具体的には、印刷胴の配列により、クランプ溝12Aの180度反対側に胴本体12を押圧することができない場合、例えば、胴本体12の外周2ヶ所から、エア吹き付け装置や電磁石等の非接触式の外圧付加装置5によりF1の力で押圧して、両者の合力Fの方向をクランプ溝12Aの180度反対側にくるように構成してある。そして、このような本実施形態では、前記各実施形態の①～③と同様の効果を得ることができる他、印刷胴10Aの外周から力作用させることができるので、胴本体12の内部に反力バー等を設けなくて済み、構造が簡単となり、製作が容易となるという効果がある。

【0034】また、前記各実施形態では、互いに接触する印刷胴10A、10A同士のショックマーク防止としたが、これに限らず、本発明は印刷胴10Aと10B同士間にも適用され得るものである。この場合、印刷胴10Bにも前記押圧手段2または2'と同様の押圧手段等を設けて印刷胴10Aと同様の構造とするとともに、印刷胴10Aの押圧手段は、両印刷胴10A、10Bの溝同士が会合する際にクランプ溝の反対側を押圧できるように構成すればよい。

【0035】

【発明の効果】以上に説明したように、本発明の印刷機のショックマーク防止装置によれば、印刷胴は各クランプ溝が会合する際に、押圧手段でクランプ溝の反対側を押圧するので、クランプ溝同士の接点における接触圧の低減による印刷胴への力の減少分を補償して、クランプ溝会合状態の際における反力バーによる力と印刷胴の接\*

\* 触圧力による力の合計が、クランプ溝会合状態以外の通常の接触状態の場合に印刷胴に働く力と同一となるようにすることができる。従って、印刷胴に作用する力が周期的に変動することがないので振動を防止し、振動に起因する印刷むらを防止でき、これにより、印刷品質の向上を図れるようになる。

【図面の簡単な説明】

【図1】本発明の第1実施形態に係る印刷機のショックマーク防止装置を示す全体図である。

10 【図2】図1におけるII-II線断面図である。

【図3】本第1実施形態に係る印刷胴の溝同士の接触状態を示す図である。

【図4】本発明の第2実施形態に係る印刷機のショックマーク防止装置を示す全体図である。

【図5】図4におけるV-V線断面図である。

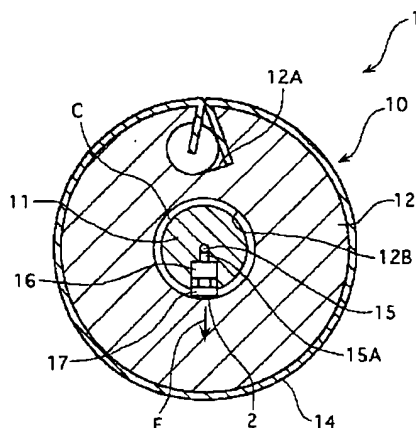
【図6】本第2実施形態に係る印刷胴の溝同士の接触状態を示す図である。

【図7】本発明の変形形態に係る印刷機のショックマーク防止装置を示す図である。

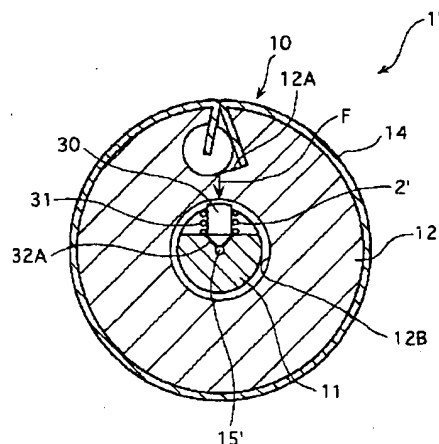
【符号の説明】

- 1、1' 印刷機のショックマーク防止装置
- 2、2' 押圧手段
- 9 ベアラ
- 10 印刷胴
- 11 反力バー
- 12 胴本体
- 12A クランプ溝
- 16 シリンダ
- 19 油圧ポンプ
- 21 サーボバルブ
- 24、24' 制御装置
- 30 磁極
- 31 コイル
- 32 電線

【図2】

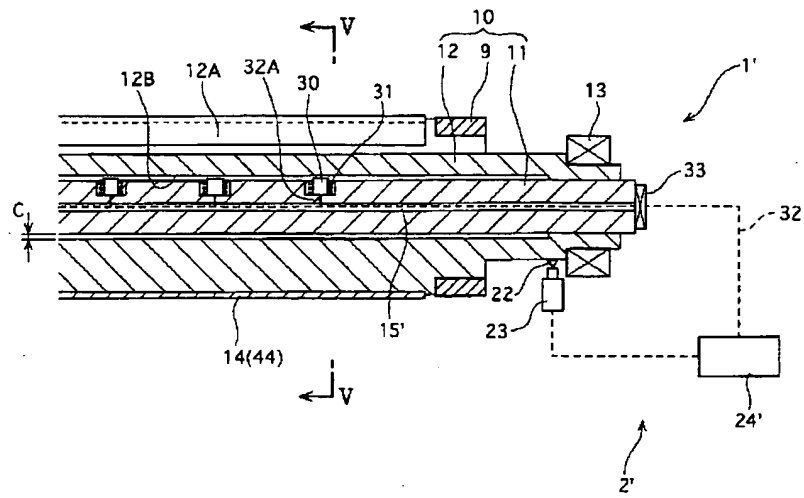


【図5】

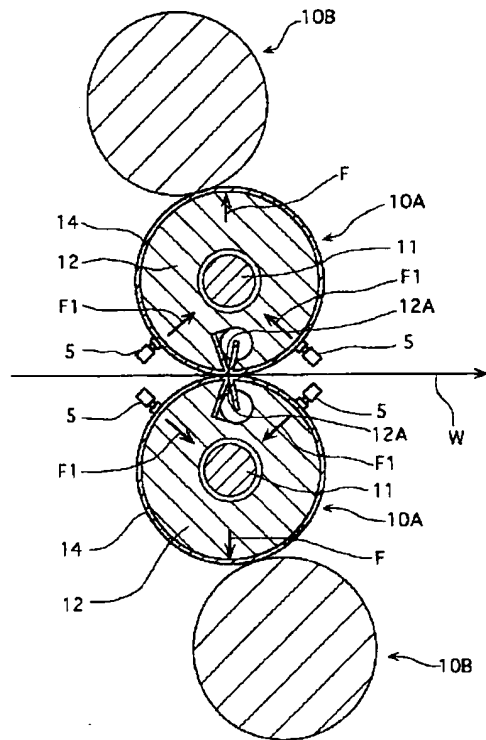




【図 4】



【図 7】





【公報種別】特許法第17条の2の規定による補正の掲載

【部門区分】第2部門第4区分

【発行日】平成13年10月30日(2001.10.30)

【公開番号】特開平11-58677

【公開日】平成11年3月2日(1999.3.2)

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【国際特許分類第7版】

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7/02

33/08

【FI】

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7/02 A

33/08 S

【手続補正書】

【提出日】平成13年2月22日(2001.2.22)

【手続補正1】

【補正対象書類名】明細書

【補正対象項目名】0032

【補正方法】変更

【補正内容】

【0032】図7の例では、2つの印刷胴10A、10

Aと10A、10Bとが接触しているとき、クランプ溝のない印刷胴10Bとクランプ溝12Aのある印刷胴10A同士は常に一定の押圧で接触しており、印刷胴10A、10Aに作用する力の変動はベアラのある胴のクランプ溝12Aにより生じる。従って、溝会合時に押圧力の変動分(減少分)にはほぼ相当する力を胴本体12の胴部に与えて、結果として、胴の撓み量の変動しないようにしたものである。

# PATENT ABSTRACTS OF JAPAN

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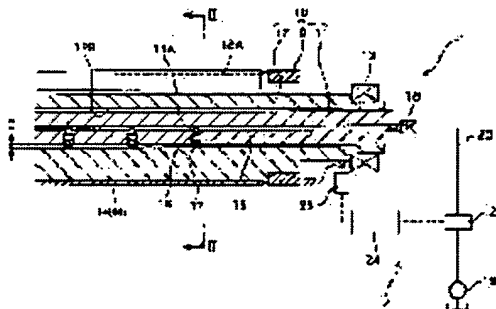
(72)Inventor : SUZUKI KATSUYUKI

## (54) SHOCK MARK PREVENTING APPARATUS OF PRINTING PRESS

### (57)Abstract:

PROBLEM TO BE SOLVED: To provide an apparatus constituted not only to prevent vibration by eliminating the fluctuations of the force acting on a printing cylinder to prevent printing irregularity but also to enhance printing quality.

SOLUTION: A shock mark preventing apparatus 1 of a printing press is equipped with a pressure means 2 constituted so that clamp grooves 12A are formed to the surfaces of a plurality of printing cylinders 10 reversively rotated in mutual contact state under a predetermined contact pressure and the fluctuations of the contact pressure generated when the clamp grooves 12A are brought to a mutual contact state accompanying the rotation of the printing cylinders 10 are suppressed and the printing cylinders 10 are pressed to the opposite side of the clamp grooves 12A in matching relation to the rotary cycles of the respective printing cylinders 10. Therefore, the forces acting on the printing cylinders 10 are not cyclically fluctuated and, as a result, vibration is prevented and the printing irregularity caused by vibration is reduced and printing quality is enhanced.



## LEGAL STATUS

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**CLAIMS**

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[Claim(s)]

[Claim 1] The clamp slot for clamping a version plate or a rubber blanket to the axis of the printing drum concerned and parallel, respectively is formed in the front face of two or more printing drums which contact and carry out inverse rotation with predetermined contact pressure. It is the shock-mark arrester of the printing machine which controls fluctuation of the contact pressure produced in case said clamp slots meet with rotation of these printing drums. The shock-mark arrester of the printing machine characterized by having a press means to double with the period to which said clamp slots of rotation of each of said printing drum meet, and to press these printing drums to the opposite side of said clamp slot.

[Claim 2] In the shock-mark arrester of a printing machine according to claim 1 said each printing drum The drum body which consists of the journal section which was supported by the bearing free [ rotation ] and was formed in the both ends of a drum section and this drum section rather than the drum section concerned in the minor diameter, It has the bearer with which the both ends of said drum section of this drum body were equipped, and the reaction force bar with which the axial center of said drum body was equipped, and is formed. Said press means The shock-mark arrester of the printing machine characterized by being a fluid actuator containing the cylinder and piston which press this drum body outside to said reaction force bar while being attached in said drum body.

[Claim 3] In the shock-mark arrester of a printing machine according to claim 2 said fluid actuator The hydraulic line by which the other end is connected to said hydraulic pump while connecting with the oil pressure hole which the hydraulic pump formed in the exterior of said printing drum and an end can open in the interior of said axial body along with the axis through a swivel joint, and is open for free passage in said cylinder, The servo valve which is prepared in the middle of this hydraulic line, and sends out the pressure oil of said hydraulic pump to said cylinder, The detector which is formed in the exterior of each of said printing drum, and detects the location of the clamp slot of said printing drum, and sends the signal, The shock-mark arrester of the printing machine characterized by equipping said servo valve with the control unit which issues a command, and being constituted so that it may become equal to the thrust beforehand set up in the pressure oil from said hydraulic pump based on the signal from this detector.

[Claim 4] In the shock-mark arrester of a printing machine according to claim 1 said each printing drum It has the drum body supported by the bearing free [ rotation ], the bearer with which the both ends of the drum section of this drum body were equipped, and the reaction force bar with which the axial center of said drum body was equipped, and is formed. Said press means The shock-mark arrester of the printing machine characterized by being an electromagnetic-force actuator containing the magnetic pole which attracts this drum body to an axial center side to said reaction force bar while being attached in said drum body.

[Claim 5] In the shock-mark arrester of a printing machine according to claim 4 said electromagnetic-force actuator The coil prepared in the perimeter of said magnetic pole, and the electric wire which extends to the exterior of an axial body through the slip ring from the wiring hole which was able to open the other end side in the interior of said axial body along with the axis while an end is connected to said coil, The detector which is formed in the exterior of each of said printing drum, and detects the location of the clamp slot of said printing drum, and sends the signal, The shock-mark arrester of the printing machine characterized by having the control unit made to

generate electromagnetic force which becomes equal to the suction force beforehand set as said coil based on the signal from this detector, and being constituted.

[Claim 6] It is the shock-mark arrester of the printing machine characterized by being the external pressure additional equipment with which said press means adds a pressure to said each printing drum from the exterior in the shock-mark arrester of a printing machine according to claim 1.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the shock-mark arrester of the printing machine which prevents the shock mark to the printing paper produced at the time of printing of offset printing.

[0002]

[Background of the Invention] The plate or rubber blanket of a metal plate is twisted around printing drums, such as a printing cylinder in offset printing, and a blanket cylinder, at the periphery. And these rubber blankets etc. are being clamped and fixed to the clamp slot in which the edge was formed along with the axis of each drum. Therefore, these clamp slots meet for every rotation at the printing cylinder which has touched mutually, a blanket drum or a blanket drum, and the contact of blanket drums.

[0003]

[Problem(s) to be Solved by the Invention] By the way, in the case of printing operation, while each drum presses mutually by the constant pressure, contact rotation is carried out. Therefore, although contact pressure is acting in the condition that a clamp slot is not located during printing at the contact of drums, between the drums which contact, if it results in the condition that a clamp slot meets in a contact, it will be in the condition that the above-mentioned contact pressure falls out. That is, the external force which acts on a printing drum will be changed periodically. Since the radius of the clamp slot of each drum has sunk slightly, it generates, and this contact pressure omission is inevitably produced in offset printing. Therefore, vibration \*\*\*\*\* by the shock in case slots meet for every rotation of a printing drum, since this vibration is imprinted by printed matter as a shock mark and makes a pattern that it was printed produce "unevenness", it has a bad influence on the pattern of printed matter, and it becomes the cause of defect printing, and printing quality is reduced.

[0004] Then, although the printing machine (double drum) which enlarged the diameter of a printing drum is also manufactured in order to press down vibration low, there is a problem that manufacture cost becomes high in this case. Moreover, although the method of reducing vibration of each printing drum with an attenuation member or a damper is also proposed, since many frequency components are contained in vibration, it is difficult [ it ] to always attenuate vibration effectively to a different print speed. Furthermore, although the printing machine which uses the seamless version and a seamless blanket is also proposed in order to lose the clamp slot of an oscillating generation source, when the manufacture cost of a version or a blanket becomes high, a blanket shifts gradually to a printing drum as printing advances, and there is a problem that printing quality deteriorates.

[0005] By controlling generating of a periodic vibration of a printing drum, the purpose of this invention decreases printing unevenness and is to offer the shock-mark arrester of the printing machine which can aim at improvement in printing quality now.

[0006]

[Means for Solving the Problem] This invention forms the equipment on which the force is made to act in the interior or the exterior of a printing drum, makes the force equivalent to the contact pressure from which it escaped act on a printing drum according to the period which the periodic omission of the contact pressure in the clamp slots of the drum which is the source of a shock of a

printing drum generates, reduces vibration, tends to decrease printing unevenness and, thereby, tends to aim at improvement in printing quality.

[0007] The shock-mark arrester of the printing machine according to claim 1 concerning this invention specifically The clamp slot for clamping a version plate or a rubber blanket to the axis of the printing drum concerned and parallel, respectively is formed in the front face of two or more printing drums which contact and carry out inverse rotation with predetermined contact pressure. It is the shock-mark arrester of the printing machine which controls fluctuation of the contact pressure produced in case said clamp slots meet with rotation of these printing drums. It is characterized by having a press means to double with the period to which the clamp slots of rotation of each printing drum meet, and to press these printing drums to the opposite side of a clamp slot.

[0008] If a printing drum says a printing cylinder, a blanket cylinder, etc. above and a printing drum is pressed to the opposite side of a slot as a press means, what kind of format will be sufficient and an oil pressure controller, a pneumatics type, an electric type, etc. will not be limited. Furthermore, as for thrust, it is desirable that it is the strength from which the sum total of the force by the force with a reaction force bar and the contact pressure of a printing drum in the case of a clamp slot meeting condition becomes almost the same as that of the force which is committed at a printing drum in the case of usual contact conditions other than a clamp slot meeting condition. Moreover, as for a press means, it is desirable that it is the 180-degree opposite side of a clamp slot on both sides of a reaction force bar.

[0009] Since each printing drum presses the opposite side of a clamp slot with a press means in such this invention in case each clamp slot meets, the contact pressure which reduces in the contact of clamp slots compensates, and it can become that it is the same as that of the force with the reaction-force bar in the case of a clamp slot meeting condition, and the force commit the sum total of the force by the contact pressure of a printing drum at a printing drum in the case of usual contact conditions other than a clamp slot meeting condition. Therefore, since fluctuation of the contact pressure of a printing drum is lost, generating of vibration is controlled and printing unevenness decreases, improvement in printing quality can be aimed at.

[0010] The shock-mark arrester of the printing machine according to claim 2 concerning this invention The drum body which consists of the journal section which was supported by the bearing free [ rotation ] and was formed in the both ends of a drum section and this drum section rather than the drum section concerned in each printing drum according to claim 1 in the minor diameter, The bearer with which the both ends of said drum section of this drum body were equipped, and the reaction force bar with which the axial center of a drum body was equipped are had and formed. A press means While being attached in a drum body, it is characterized by being a fluid actuator containing the cylinder and piston which press this drum body outside to a reaction force bar. In such this invention, since the opposite side of a clamp slot is pressed in case it controls by the fluid actuator correctly and easily and a clamp slot meets, vibration of a printing drum is controlled, printing unevenness decreases, and, thereby, improvement in printing quality can be aimed at.

[0011] The shock-mark arrester of the printing machine according to claim 3 concerning this invention The hydraulic pump in which a fluid actuator according to claim 2 is formed to the exterior of a printing drum, The hydraulic line by which the other end is connected to a hydraulic pump while connecting with the oil pressure hole which an end can open in the interior of an axial body along with the axis through a swivel joint, and is open for free passage in a cylinder, The servo valve which is prepared in the middle of this hydraulic line, and sends out the pressure oil of a hydraulic pump to a cylinder, The detector which is formed in the exterior of each printing drum, and detects the location of the clamp slot of a printing drum, and sends the signal, It is characterized by having and constituting the control unit which takes out a command to a servo valve so that it may become equal to the thrust beforehand set up in the pressure oil from a hydraulic pump based on the signal from this detector. In such this invention, in case it controls by the fluid actuator correctly and easily and a clamp slot meets, since the opposite side of a clamp slot is pressed, fluctuation of vibration of a printing drum is controlled, printing unevenness decreases a drum body, and, thereby, improvement in printing quality can be aimed at.

[0012] The shock-mark arrester of the printing machine according to claim 4 concerning this invention The drum body supported by the bearing free [ rotation ] in each printing drum according

to claim 1, The bearer with which the both ends of the drum section of this drum body were equipped, and the reaction force bar with which the axial center of a drum body was equipped are had and formed. A press means While being attached in a drum body, it is characterized by being an electromagnetic-force actuator containing the magnetic pole which attracts this drum body to an axial center side to said reaction force bar. By such this invention, since a drum body is attracted to the opposite direction of a clamp slot in case it controls by the electromagnetic-force actuator correctly and easily and a clamp slot meets, vibration of a printing drum is controlled, printing unevenness decreases, and, thereby, improvement in printing quality can be aimed at with an easy configuration.

[0013] The shock-mark arrester of the printing machine according to claim 5 concerning this invention The coil in which the electromagnetic-force actuator according to claim 4 was formed around the magnetic pole, The electric wire which extends to the exterior of an axial body through the slip ring from the wiring hole with which the other end side ended along with the axis inside the axial body while an end is connected to a coil, It is characterized by having and constituting the detector which is formed in the exterior of each printing drum, and detects the location of the clamp slot of a printing drum, and sends that signal, and the control unit made to generate electromagnetic force which becomes equal to the suction force beforehand set as the coil based on the signal from this detector. By such this invention, since a drum body is attracted to the opposite direction of a clamp slot in case it controls by the electromagnetic-force actuator correctly and easily and a clamp slot meets, vibration of a printing drum is controlled, printing unevenness decreases, and, thereby, improvement in printing quality can be aimed at with an easy configuration.

[0014] The shock-mark arrester of the printing machine according to claim 6 concerning this invention is characterized by using a press means as the external pressure additional equipment which adds a pressure to each printing drum from the exterior in the shock-mark arrester of a printing machine according to claim 1. The thing it is made not to affect it above with non-contact actuators, such as Ayr blasting equipment and an electromagnet, as external pressure additional equipment at the printing pattern of a printing drum front face is desirable, and when it cannot necessarily press to the opposite side 180 degrees according to the array of a printing drum, fluctuation of the force of pressing in the direction somewhat shifted and acting on a drum is prevented, and you may make it control vibration. In such this invention, since the force is applied to a printing drum from the exterior, it becomes unnecessary to prepare a cylinder etc. in the interior of a printing drum, and structure becomes easy.

[0015]

[Embodiment of the Invention] Below, the operation gestalt of this invention is explained based on a drawing. As shown in drawing 1 -3, the shock-mark arrester 1 of the printing machine of the 1st operation gestalt of this invention presses a printing drum to the opposite side of clamp slot 12A with the press means 2 which used the fluid actuator.

[0016] The printing drum 10 of this operation gestalt is described first. The printing drum 10 is formed in the both ends of a drum section and this drum section including the drum body 12 which consists of the journal section formed in the minor diameter, the bearer 9 with which the both ends of the drum section of this drum body 12 were equipped, and the reaction force bar 11 inserted in the core of the drum body 12 rather than the drum section concerned, and a blanket 14 or \*\*\*\* 44 is wound around the periphery of the drum section of such a printing drum 10. Said journal section is formed the \*\* with a stage of a minor diameter, and the part of \*\*\*\*\* of the journal section is supported by the bearing 13. Therefore, the printing drum 10 can be rotated freely.

[0017] moreover, it is \*\*\*\* containing a predetermined dimension from the interior and the edge of the drum body 12 to the inside -- between parts, hole 12B of a bigger inside diameter than the dimension of the reaction force bar 11 has ended, and the clearance C between predetermined dimensions will be formed between the reaction force bar 11 and the bore of the drum body 12 by this. Along with that axis, clamp slot of one articles 12A is formed in the periphery of the drum body 12, and a rubber blanket 14 or the edge of \*\*\*\* 44 is clamped and fixed to this clamp slot 12A.

[0018] In the direction core of an axis of the reaction force bar 11, the oil pressure hole 15 has ended covering the overall length of the reaction force bar 11. Moreover, inside the reaction force bar 11, while intersecting perpendicularly with that axis, a cylinder 16 is formed in the about 180-degree



opposite side of clamp slot 12A, and this cylinder 16 has the piston 17 whose receipts and payments in reaction force bar 11 axis and the rectangular direction were attained. Moreover, more than one are arranged at intervals of predetermined in the die-length direction of the reaction force bar 11. And these cylinders 16 and the above-mentioned oil pressure hole 15 are connected by communicating pore 15A, respectively. Here, when the piston 17 of a cylinder 16 comes out, the tip contacts bore 12B of the drum body 12, and can press the drum body 12 on the 180-degree outside of clamp slot 12A to the reaction force bar 11.

[0019] The swivel joint 18 is attached in the end face of the reaction force bar 11, and the end of a hydraulic line 20 by which the other end was connected to the hydraulic pump 19 is connected to this swivel joint 18. Moreover, the servo valve 21 which supplies the pressure oil from a hydraulic pump 19 to a cylinder 16 in the middle of this hydraulic line 20 is arranged. It is fixed to the opposite side 180 degrees, a dog 22 is formed, and the detector 23 of clamp slot 12A which, on the other hand, detects the location of this dog 22 on the frame which is not illustrated is formed in the periphery of the drum body 12. And this detector 23 takes out a signal with the timing to which the printing drums (blanket cylinder with which it was equipped with the rubber blanket 14) 10A and 10A which touch mutually or printing drum 10A, and clamp slot 12A of 10B (printing cylinder with which it was equipped with \*\*\*\* 44) meet in a contact, as shown in drawing 3.

[0020] Moreover, a control unit 24 is formed in the exterior of the printing drum 10, and if the signal of the clamp slot meeting from a detector 23 is received, this control unit 24 will take out a command to a servo valve 21 so that the pressure oil which compensates a part for contact pressure to fall out may be supplied to a cylinder 16. In addition, the force of a part from which the contact pressure called for by means, such as an observation, escapes is set up beforehand. And in here, including each part material expressed with the sign of a continuation of a single string from the oil pressure hole 15 to a control device 24, said fluid actuator 2 is constituted and this fluid actuator 2 serves as said press means.

[0021] Next, the power relationship which acts between each printing drum 10 at the time of having arranged such every two printing drums 10 up and down on both sides of the web W which is a continuous stationary, and carrying out to double-sided printing based on drawing 3 is explained. On both sides of Web W, up and down, with predetermined contact pressure, the blanket cylinders 10A and 10A of a printing drum contact, and each other are arranged, and with predetermined contact pressure, printing cylinders 10B and 10B contact, and each other are arranged at each blanket cylinder 10A and 10A. Therefore, between printing drum 10A which touches mutually, and 10A, and between 10A and 10B, it is acting in the direction in which contact pressure makes one drum desert a partner drum in the contact.

[0022] Namely, while two printing drums 10A and 10A etc. are pushing one another and rotating, mutual drum 10A is in the condition of it having been pushed from the other party and having bent in response to the load covering the overall length of a drum. Although this amount of bending is decided by the diameter and \*\*\*\* (holding-down pressure of drums) of \*\*\*\*, the die length of a drum, and the journal section of a drum, it has become about several mm / 100 about.

[0023] If it results in a contact at angle of rotation to which clamp slot 12A meets, since the radius of the part of clamp slot 12A is slightly depressed, the omission of contact pressure arises, contact pressure will be reduced, it will bend in the case of a slot meeting of \*\*\*\*\*, and an amount will be changed (reduction). However, the piston 17 of the cylinder 16 prepared in the reaction force bar 11 by the clamp slot meeting signal from a detector 23 at this time Press the drum body 12 to the 180-degree opposite side of clamp slot 12A, and the force for contact pressure to have decreased is made to act on each printing drums 10A and 10A. By this It is made for the sum total of the force which acts on the printing drums 10A and 10A to become the same as a condition when other conditions, i.e., clamp slot 12A, are not meeting in the clamp slot meeting condition, either. Therefore, changing periodically the force of acting on the printing drums 10A and 10A is lost, thereby, fluctuation of vibration can be controlled and the printing unevenness resulting from vibration can be prevented now.

[0024] In addition, the drum section 42 of printing cylinder 10B of a printing drum is equipped with the version plate 44, and the edge of this version plate 44 is being clamped and fixed to clamp slot 42A. Moreover, the press means which contains a cylinder etc. also in this printing cylinder 10B

may be established.

[0025] According to such this operation gestalt, there is the following effectiveness.

\*\* In the meeting condition of clamp slot 12A, it becomes the same as that of the force which the sum total of the force with the reaction force bar 11 and the force by the contact pressure of printing drum 10 comrades commits on the printing drum 10 in the case of usual contact conditions other than the meeting condition of slot 12A, and the force of acting on a printing drum during 1 rotation will always be changed as a result. Therefore, since fluctuation of vibration of the printing drum 10 is controlled and printing unevenness is lost, generating of a shock mark can be prevented and, thereby, improvement in printing quality can be aimed at.

[0026] \*\* Since a dog 22 is formed in the periphery of the journal section of the drum body 12, the detector 23 which detects the location of this dog 22 is formed in the frame of a printing machine on the other hand and the pressure oil of optimum dose is supplied to a cylinder 16 with a control unit 24 in response to the signal of the clamp slot detection from this detector 23, the force can be made to act on the drum body 12 correctly.

\*\* Since the drum body 12 can be equally pressed to the reaction force bar 11 since the cylinder 16 prepared in the interior of the drum body 12 has more than one in the longitudinal direction of the drum body 12 at intervals of predetermined, the force in which this acts on the printing drum 10 is not changed, vibration is prevented and printing unevenness is lost, improvement in printing quality can be aimed at.

[0027] drawing 4 - six -- \*\*\*\* -- this invention -- the -- two -- operation -- a gestalt -- being shown -- having -- \*\*\*\* -- this -- operation -- a gestalt -- a printing machine -- a shock mark -- an arrester -- one -- ' -- said -- the -- one -- operation -- a gestalt -- press -- a means -- two -- a fluid -- an actuator -- using -- a thing -- receiving -- electromagnetic force -- an actuator -- having used -- press -- a means -- two -- ' -- a drum -- a body -- 12 -- reaction force -- a bar -- 11 -- receiving -- a clamp -- a slot -- 12 -- A -- the opposite side -- press (suction) -- carrying out -- a thing -- it is . Therefore, in this operation gestalt, while explaining only a different part from said 1st operation gestalt and giving the same sign to the same structure as the 1st operation gestalt, and a member, detailed explanation is omitted or simplified.

[0028] Wiring hole 15' ends along with the axis, and it replaces with said cylinder 16, and the magnetic pole 30 and the coil 31 are formed in the interior of the reaction force bar 11. Wiring hole 15', and this magnetic pole 30 and coil 31 crossed at right angles, and it has been arranged at the same side as clamp slot 12A, and the magnetic pole 30 has ended and countered bore 12B of the drum body 12, and a clearance.

[0029] wiring hole 15' -- inside, the electric wire 32 which an end connects to the above-mentioned coil 31, and the other end connects to control unit 24' is inserted in, and this electric wire 32 and coil 31 are connected with it by connection line 32A. The slip ring 33 is formed in the edge of the reaction force bar 11. Control unit 24' will output the current which generates the electromagnetic force of the contact pressure compensation pattern set up beforehand to a coil 31, if the signal of a clamp slot meeting is received from a detector 23. Therefore, by outputting a current to a coil 31, the magnetic pole 30 operated, the clamp slot 12A side of the drum body 12 was attracted to the reaction force bar 11 side, this compensated the force for contact pressure to have decreased at the time of a meeting of clamp slot 12A, fluctuation of the force of acting on a printing drum was prevented, and generating of vibration is controlled.

[0030] As shown in drawing 6 , when the printing drum 10 using such an electromagnetic-force actuator with shock-mark arrester 1' has been arranged, an operation of the same force as said 1st operation gestalt commits it between each drum 10A and 10A etc. However, although the drum body 12 is pressed to the reaction force bar 11 and there is a difference in a point which attracted the drum body 12 to the reaction force bar 11 side in a \*\*\*\* 2 operation gestalt with the 1st operation gestalt, the force is made to act on the opposite side of clamp slot 12A as a result, and effectiveness will also become the same. And with such this operation gestalt, the same operation effectiveness as the aforementioned \*\* - \*\* can be acquired.

[0031] In addition, if this invention is not limited to said each operation gestalt and the purpose of this invention can be attained, it includes the following deformation gestalten. That is, although the press means 2, the cylinder 16 which prepared 2' in the interior of the reaction force bar 11, and

magnetic pole 30 grade shall be included with said each operation gestalt, as shown not only in this but in drawing 7, the force may be applied with a non-contact type actuator from the exterior of the printing drums 10A and 10A.

[0032] In the example of drawing 7, when two printing drums 10A and 10A, and 10A and 10B touch, printing drum 10A with printing drum 10B without a clamp slot and clamp slot 12A always touches by fixed press, and fluctuation of the force of acting on the printing drums 10A and 10A is produced by clamp slot 12A of a drum with a bearer. Therefore, the force which is mostly equivalent to a changed part (decrement) of thrust at the time of a slot meeting is given to the drum section or bearer of the drum body 12, and it is made not to change the amount of bending of a drum as a result.

[0033] Specifically, it constitutes when the drum body 12 cannot be pressed to the 180-degree opposite side of clamp slot 12A according to the array of a printing drum, for example, so that it may press by five by the force of the non-contact-type external pressure additional equipmentF1, such as air blasting equipment and an electromagnet, and the direction of both resultant force F may be come to the 180-degree opposite side of clamp slot 12A from two peripheries of the drum body 12. And with such this operation gestalt, since the same effectiveness as \*\* of each of said operation gestalt - \*\* can be acquired and also the force can be made to act from the exterior of printing drum 10A, it is effective in not preparing a reaction force bar etc. in the interior of the drum body 12, structure becoming easy, and manufacture becoming easy.

[0034] Moreover, although considered as shock-mark prevention of printing drum 10A which contacts mutually, and 10A with said each operation gestalt, not only this but this invention may be applied also between printing drum 10A and 10B. In this case, what is necessary is just to constitute the press means of printing drum 10A so that the opposite side of a clamp slot can be pressed in case the slots of the duplex-printing drums 10A and 10B meet while forming said press means 2 or the same press means as 2' also in printing drum 10B and considering as the same structure as printing drum 10A.

[0035]

[Effect of the Invention] Since a printing drum presses the opposite side of a clamp slot with a press means according to the shock-mark arrester of the printing machine of this invention in case each clamp slot meets as explained above The decrement of the force to the printing drum by reduction of the contact pressure in the contact of clamp slots is compensated. The sum total of the force by the force with a reaction force bar and the contact pressure of a printing drum in the case of a clamp slot meeting condition can become the same as that of the force which is committed at a printing drum in the case of usual contact conditions other than a clamp slot meeting condition. Therefore, since the force of acting on a printing drum is not changed periodically, vibration is prevented, the printing unevenness resulting from vibration can be prevented, and, thereby, improvement in printing quality can be aimed at now.

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[Translation done.]

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TECHNICAL FIELD

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[Field of the Invention] This invention relates to the shock-mark arrester of the printing machine which prevents the shock mark to the printing paper produced at the time of printing of offset printing.

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PRIOR ART

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[Background of the Invention] The plate or rubber blanket of a metal plate is twisted around printing drums, such as a printing cylinder in offset printing, and a blanket cylinder, at the periphery. And these rubber blankets etc. are being clamped and fixed to the clamp slot in which the edge was formed along with the axis of each drum. Therefore, these clamp slots meet for every rotation at the printing cylinder which has touched mutually, a blanket drum or a blanket drum, and the contact of blanket drums.

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EFFECT OF THE INVENTION

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[Effect of the Invention] Since a printing drum presses the opposite side of a clamp slot with a press means according to the shock-mark arrester of the printing machine of this invention in case each clamp slot meets as explained above, The decrement of the force to the printing drum by reduction of the contact pressure in the contact of clamp slots is compensated, and the sum total of the force by the force with a reaction force bar and the contact pressure of a printing drum in the case of a clamp slot meeting condition can become the same as that of the force which is committed at a printing drum in the case of usual contact conditions other than a clamp slot meeting condition. Therefore, since the force of acting on a printing drum is not changed periodically, vibration is prevented, the printing unevenness resulting from vibration can be prevented, and, thereby, improvement in printing quality can be aimed at now.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] By the way, in the case of printing operation, while each drum presses mutually by the constant pressure, contact rotation is carried out. Therefore, although contact pressure is acting in the condition that a clamp slot is not located during printing at the contact of drums, between the drums which contact, if it results in the condition that a clamp slot meets in a contact, it will be in the condition that the above-mentioned contact pressure falls out. That is, the external force which acts on a printing drum will be changed periodically. Since the radius of the clamp slot of each drum has sunk slightly, it generates, and this contact pressure omission is inevitably produced in offset printing. Therefore, vibration \*\*\*\*\* by the shock in case slots meet for every rotation of a printing drum, since this vibration is imprinted by printed matter as a shock mark and makes a pattern that it was printed produce "unevenness", it has a bad influence on the pattern of printed matter, and it becomes the cause of defect printing, and printing quality is reduced.

[0004] Then, although the printing machine (double drum) which enlarged the diameter of a printing drum is also manufactured in order to press down vibration low, there is a problem that manufacture cost becomes high in this case. Moreover, although the method of reducing vibration of each printing drum with an attenuation member or a damper is also proposed, since many frequency components are contained in vibration, it is difficult [ it ] to always attenuate vibration effectively to a different print speed. Furthermore, although the printing machine which uses the seamless version and a seamless blanket is also proposed in order to lose the clamp slot of an oscillating generation source, when the manufacture cost of a version or a blanket becomes high, a blanket shifts gradually to a printing drum as printing advances, and there is a problem that printing quality deteriorates.

[0005] By controlling generating of a periodic vibration of a printing drum, the purpose of this invention decreases printing unevenness and is to offer the shock-mark arrester of the printing machine which can aim at improvement in printing quality now.

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MEANS

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[Means for Solving the Problem] This invention forms the equipment on which the force is made to act in the interior or the exterior of a printing drum, makes the force equivalent to the contact pressure from which it escaped act on a printing drum according to the period which the periodic omission of the contact pressure in the clamp slots of the drum which is the source of a shock of a printing drum generates, reduces vibration, tends to decrease printing unevenness and, thereby, tends to aim at improvement in printing quality.

[0007] The shock-mark arrester of the printing machine according to claim 1 concerning this invention specifically The clamp slot for clamping a version plate or a rubber blanket to the axis of the printing drum concerned and parallel, respectively is formed in the front face of two or more printing drums which contact and carry out inverse rotation with predetermined contact pressure. It is the shock-mark arrester of the printing machine which controls fluctuation of the contact pressure produced in case said clamp slots meet with rotation of these printing drums. It is characterized by having a press means to double with the period to which the clamp slots of rotation of each printing drum meet, and to press these printing drums to the opposite side of a clamp slot.

[0008] If a printing drum says a printing cylinder, a blanket cylinder, etc. above and a printing drum is pressed to the opposite side of a slot as a press means, what kind of format will be sufficient and an oil pressure controller, a pneumatics type, an electric type, etc. will not be limited. Furthermore, as for thrust, it is desirable that it is the strength from which the sum total of the force by the force with a reaction force bar and the contact pressure of a printing drum in the case of a clamp slot meeting condition becomes almost the same as that of the force which is committed at a printing drum in the case of usual contact conditions other than a clamp slot meeting condition. Moreover, as for a press means, it is desirable that it is the 180-degree opposite side of a clamp slot on both sides of a reaction force bar.

[0009] Since each printing drum presses the opposite side of a clamp slot with a press means in such this invention in case each clamp slot meets, the contact pressure which reduces in the contact of clamp slots compensates, and it can become that it is the same as that of the force with the reaction-force bar in the case of a clamp slot meeting condition, and the force commit the sum total of the force by the contact pressure of a printing drum at a printing drum in the case of usual contact conditions other than a clamp slot meeting condition. Therefore, since fluctuation of the contact pressure of a printing drum is lost, generating of vibration is controlled and printing unevenness decreases, improvement in printing quality can be aimed at.

[0010] The shock-mark arrester of the printing machine according to claim 2 concerning this invention The drum body which consists of the journal section which was supported by the bearing free [ rotation ] and was formed in the both ends of a drum section and this drum section rather than the drum section concerned in each printing drum according to claim 1 in the minor diameter, The bearer with which the both ends of said drum section of this drum body were equipped, and the reaction force bar with which the axial center of a drum body was equipped are had and formed. A press means While being attached in a drum body, it is characterized by being a fluid actuator containing the cylinder and piston which press this drum body outside to a reaction force bar. In such this invention, since the opposite side of a clamp slot is pressed in case it controls by the fluid actuator correctly and easily and a clamp slot meets, vibration of a printing drum is controlled, printing unevenness decreases, and, thereby, improvement in printing quality can be aimed at.



[0011] The shock-mark arrester of the printing machine according to claim 3 concerning this invention The hydraulic pump in which a fluid actuator according to claim 2 is formed to the exterior of a printing drum, The hydraulic line by which the other end is connected to a hydraulic pump while connecting with the oil pressure hole which an end can open in the interior of an axial body along with the axis through a swivel joint, and is open for free passage in a cylinder, The servo valve which is prepared in the middle of this hydraulic line, and sends out the pressure oil of a hydraulic pump to a cylinder, The detector which is formed in the exterior of each printing drum, and detects the location of the clamp slot of a printing drum, and sends the signal, It is characterized by having and constituting the control unit which takes out a command to a servo valve so that it may become equal to the thrust beforehand set up in the pressure oil from a hydraulic pump based on the signal from this detector. In such this invention, in case it controls by the fluid actuator correctly and easily and a clamp slot meets, since the opposite side of a clamp slot is pressed, fluctuation of vibration of a printing drum is controlled, printing unevenness decreases a drum body, and, thereby, improvement in printing quality can be aimed at.

[0012] The shock-mark arrester of the printing machine according to claim 4 concerning this invention The drum body supported by the bearing free [ rotation ] in each printing drum according to claim 1, The bearer with which the both ends of the drum section of this drum body were equipped, and the reaction force bar with which the axial center of a drum body was equipped are had and formed. A press means While being attached in a drum body, it is characterized by being an electromagnetic-force actuator containing the magnetic pole which attracts this drum body to an axial center side to said reaction force bar. By such this invention, since a drum body is attracted to the opposite direction of a clamp slot in case it controls by the electromagnetic-force actuator correctly and easily and a clamp slot meets, vibration of a printing drum is controlled, printing unevenness decreases, and, thereby, improvement in printing quality can be aimed at with an easy configuration.

[0013] The shock-mark arrester of the printing machine according to claim 5 concerning this invention The coil in which the electromagnetic-force actuator according to claim 4 was formed around the magnetic pole, The electric wire which extends to the exterior of an axial body through the slip ring from the wiring hole with which the other end side ended along with the axis inside the axial body while an end is connected to a coil, It is characterized by having and constituting the detector which is formed in the exterior of each printing drum, and detects the location of the clamp slot of a printing drum, and sends that signal, and the control unit made to generate electromagnetic force which becomes equal to the suction force beforehand set as the coil based on the signal from this detector. By such this invention, since a drum body is attracted to the opposite direction of a clamp slot in case it controls by the electromagnetic-force actuator correctly and easily and a clamp slot meets, vibration of a printing drum is controlled, printing unevenness decreases, and, thereby, improvement in printing quality can be aimed at with an easy configuration.

[0014] The shock-mark arrester of the printing machine according to claim 6 concerning this invention is characterized by using a press means as the external pressure additional equipment which adds a pressure to each printing drum from the exterior in the shock-mark arrester of a printing machine according to claim 1. The thing it is made not to affect it above with non-contact actuators, such as Ayr blasting equipment and an electromagnet, as external pressure additional equipment at the printing pattern of a printing drum front face is desirable, and when it cannot necessarily press to the opposite side 180 degrees according to the array of a printing drum, fluctuation of the force of pressing in the direction somewhat shifted and acting on a drum is prevented, and you may make it control vibration. In such this invention, since the force is applied to a printing drum from the exterior, it becomes unnecessary to prepare a cylinder etc. in the interior of a printing drum, and structure becomes easy.

[0015]

[Embodiment of the Invention] Below, the operation gestalt of this invention is explained based on a drawing. As shown in drawing 1 -3, the shock-mark arrester 1 of the printing machine of the 1st operation gestalt of this invention presses a printing drum to the opposite side of clamp slot 12A with the press means 2 which used the fluid actuator.

[0016] The printing drum 10 of this operation gestalt is described first. The printing drum 10 is

formed in the both ends of a drum section and this drum section including the drum body 12 which consists of the journal section formed in the minor diameter, the bearer 9 with which the both ends of the drum section of this drum body 12 were equipped, and the reaction force bar 11 inserted in the core of the drum body 12 rather than the drum section concerned, and a blanket 14 or \*\*\*\* 44 is wound around the periphery of the drum section of such a printing drum 10. Said journal section is formed the \*\* with a stage of a minor diameter, and the part of \*\*\*\*\* of the journal section is supported by the bearing 13. Therefore, the printing drum 10 can be rotated freely.

[0017] moreover, it is \*\*\*\* containing a predetermined dimension from the interior and the edge of the drum body 12 to the inside -- between parts, hole 12B of a bigger inside diameter than the dimension of the reaction force bar 11 has ended, and the clearance C between predetermined dimensions will be formed between the reaction force bar 11 and the bore of the drum body 12 by this. Along with that axis, clamp slot of one articles 12A is formed in the periphery of the drum body 12, and a rubber blanket 14 or the edge of \*\*\*\* 44 is clamped and fixed to this clamp slot 12A.

[0018] In the direction core of an axis of the reaction force bar 11, the oil pressure hole 15 has ended covering the overall length of the reaction force bar 11. Moreover, inside the reaction force bar 11, while intersecting perpendicularly with that axis, a cylinder 16 is formed in the about 180-degree opposite side of clamp slot 12A, and this cylinder 16 has the piston 17 whose receipts and payments in reaction force bar 11 axis and the rectangular direction were attained. Moreover, more than one are arranged at intervals of predetermined in the die-length direction of the reaction force bar 11. And these cylinders 16 and the above-mentioned oil pressure hole 15 are connected by communicating pore 15A, respectively. Here, when the piston 17 of a cylinder 16 comes out, the tip contacts bore 12B of the drum body 12, and can press the drum body 12 on the 180-degree outside of clamp slot 12A to the reaction force bar 11.

[0019] The swivel joint 18 is attached in the end face of the reaction force bar 11, and the end of a hydraulic line 20 by which the other end was connected to the hydraulic pump 19 is connected to this swivel joint 18. Moreover, the servo valve 21 which supplies the pressure oil from a hydraulic pump 19 to a cylinder 16 in the middle of this hydraulic line 20 is arranged. It is fixed to the opposite side 180 degrees, a dog 22 is formed, and the detector 23 of clamp slot 12A which, on the other hand, detects the location of this dog 22 on the frame which is not illustrated is formed in the periphery of the drum body 12. And this detector 23 takes out a signal with the timing to which the printing drums (blanket cylinder with which it was equipped with the rubber blanket 14) 10A and 10A which touch mutually or printing drum 10A, and clamp slot 12A of 10B (printing cylinder with which it was equipped with \*\*\*\* 44) meet in a contact, as shown in drawing 3.

[0020] Moreover, a control unit 24 is formed in the exterior of the printing drum 10, and if the signal of the clamp slot meeting from a detector 23 is received, this control unit 24 will take out a command to a servo valve 21 so that the pressure oil which compensates a part for contact pressure to fall out may be supplied to a cylinder 16. In addition, the force of a part from which the contact pressure called for by means, such as an observation, escapes is set up beforehand. And in here, including each part material expressed with the sign of a continuation of a single string from the oil pressure hole 15 to a control device 24, said fluid actuator 2 is constituted and this fluid actuator 2 serves as said press means.

[0021] Next, the power relationship which acts between each printing drum 10 at the time of having arranged such every two printing drums 10 up and down on both sides of the web W which is a continuous stationary, and carrying out to double-sided printing based on drawing 3 is explained. On both sides of Web W, up and down, with predetermined contact pressure, the blanket cylinders 10A and 10A of a printing drum contact, and each other are arranged, and with predetermined contact pressure, printing cylinders 10B and 10B contact, and each other are arranged at each blanket cylinder 10A and 10A. Therefore, between printing drum 10A which touches mutually, and 10A, and between 10A and 10B, it is acting in the direction in which contact pressure makes one drum desert a partner drum in the contact.

[0022] Namely, while two printing drums 10A and 10A etc. are pushing one another and rotating, mutual drum 10A is in the condition of it having been pushed from the other party and having bent in response to the load covering the overall length of a drum. Although this amount of bending is decided by the diameter and \*\*\*\* (holding-down pressure of drums) of \*\*\*\*, the die length of a

drum, and the journal section of a drum, it has become about several mm / 100 about.

[0023] If it results in a contact at angle of rotation to which clamp slot 12A meets, since the radius of the part of clamp slot 12A is slightly depressed, the omission of contact pressure arises, contact pressure will be reduced, it will bend in the case of a slot meeting of \*\*\*\*\*, and an amount will be changed (reduction). However, the piston 17 of the cylinder 16 prepared in the reaction force bar 11 by the clamp slot meeting signal from a detector 23 at this time Press the drum body 12 to the 180-degree opposite side of clamp slot 12A, and the force for contact pressure to have decreased is made to act on each printing drums 10A and 10A. By this It is made for the sum total of the force which acts on the printing drums 10A and 10A to become the same as a condition when other conditions, i.e., clamp slot 12A, are not meeting in the clamp slot meeting condition, either. Therefore, changing periodically the force of acting on the printing drums 10A and 10A is lost, thereby, fluctuation of vibration can be controlled and the printing unevenness resulting from vibration can be prevented now.

[0024] In addition, the drum section 42 of printing cylinder 10B of a printing drum is equipped with the version plate 44, and the edge of this version plate 44 is being clamped and fixed to clamp slot 42A. Moreover, the press means which contains a cylinder etc. also in this printing cylinder 10B may be established.

[0025] According to such this operation gestalt, there is the following effectiveness.

\*\* In the meeting condition of clamp slot 12A, it becomes the same as that of the force which the sum total of the force with the reaction force bar 11 and the force by the contact pressure of printing drum 10 comrades commits on the printing drum 10 in the case of usual contact conditions other than the meeting condition of slot 12A, and the force of acting on a printing drum during 1 rotation will always be changed as a result. Therefore, since fluctuation of vibration of the printing drum 10 is controlled and printing unevenness is lost, generating of a shock mark can be prevented and, thereby, improvement in printing quality can be aimed at.

[0026] \*\* Since a dog 22 is formed in the periphery of the journal section of the drum body 12, the detector 23 which detects the location of this dog 22 is formed in the frame of a printing machine on the other hand and the pressure oil of optimum dose is supplied to a cylinder 16 with a control unit 24 in response to the signal of the clamp slot detection from this detector 23, the force can be made to act on the drum body 12 correctly.

\*\* Since the drum body 12 can be equally pressed to the reaction force bar 11 since the cylinder 16 prepared in the interior of the drum body 12 has more than one in the longitudinal direction of the drum body 12 at intervals of predetermined, the force in which this acts on the printing drum 10 is not changed, vibration is prevented and printing unevenness is lost, improvement in printing quality can be aimed at.

[0027] drawing 4 - six -- \*\*\*\* -- this invention -- the -- two -- operation -- a gestalt -- being shown -- having -- \*\*\*\* -- this -- operation -- a gestalt -- a printing machine -- a shock mark -- an arrester -- one -- ' -- said -- the -- one -- operation -- a gestalt -- press -- a means -- two -- a fluid -- an actuator -- using -- a thing -- receiving -- electromagnetic force -- an actuator -- having used -- press -- a means -- two -- ' -- a drum -- a body -- 12 -- reaction force -- a bar -- 11 -- receiving -- a clamp -- a slot -- 12 -- A -- the opposite side -- press (suction) -- carrying out -- a thing -- it is . Therefore, in this operation gestalt, while explaining only a different part from said 1st operation gestalt and giving the same sign to the same structure as the 1st operation gestalt, and a member, detailed explanation is omitted or simplified.

[0028] Wiring hole 15' ends along with the axis, and it replaces with said cylinder 16, and the magnetic pole 30 and the coil 31 are formed in the interior of the reaction force bar 11. Wiring hole 15', and this magnetic pole 30 and coil 31 crossed at right angles, and it has been arranged at the same side as clamp slot 12A, and the magnetic pole 30 has ended and countered bore 12B of the drum body 12, and a clearance.

[0029] wiring hole 15' -- inside, the electric wire 32 which an end connects to the above-mentioned coil 31, and the other end connects to control unit 24' is inserted in, and this electric wire 32 and coil 31 are connected with it by connection line 32A. The slip ring 33 is formed in the edge of the reaction force bar 11. Control unit 24' will output the current which generates the electromagnetic force of the contact pressure compensation pattern set up beforehand to a coil 31, if the signal of a

clamp slot meeting is received from a detector 23. Therefore, by outputting a current to a coil 31, the magnetic pole 30 operated, the clamp slot 12A side of the drum body 12 was attracted to the reaction force bar 11 side, this compensated the force for contact pressure to have decreased at the time of a meeting of clamp slot 12A, fluctuation of the force of acting on a printing drum was prevented, and generating of vibration is controlled.

[0030] As shown in drawing 6, when the printing drum 10 using such an electromagnetic-force actuator with shock-mark arrester 1' has been arranged, an operation of the same force as said 1st operation gestalt commits it between each drum 10A and 10A etc. However, although the drum body 12 is pressed to the reaction force bar 11 and there is a difference in a point which attracted the drum body 12 to the reaction force bar 11 side in a \*\*\*\* 2 operation gestalt with the 1st operation gestalt, the force is made to act on the opposite side of clamp slot 12A as a result, and effectiveness will also become the same. And with such this operation gestalt, the same operation effectiveness as the aforementioned \*\* - \*\* can be acquired.

[0031] In addition, if this invention is not limited to said each operation gestalt and the purpose of this invention can be attained, it includes the following deformation gestalten. That is, although the press means 2, the cylinder 16 which prepared 2' in the interior of the reaction force bar 11, and magnetic pole 30 grade shall be included with said each operation gestalt, as shown not only in this but in drawing 7, the force may be applied with a non-contact type actuator from the exterior of the printing drums 10A and 10A.

[0032] In the example of drawing 7, when two printing drums 10A and 10A, and 10A and 10B touch, printing drum 10A with printing drum 10B without a clamp slot and clamp slot 12A always touches by fixed press, and fluctuation of the force of acting on the printing drums 10A and 10A is produced by clamp slot 12A of a drum with a bearer. Therefore, the force which is mostly equivalent to a changed part (decrement) of thrust at the time of a slot meeting is given to the drum section or bearer of the drum body 12, and it is made not to change the amount of bending of a drum as a result.

[0033] Specifically, it constitutes when the drum body 12 cannot be pressed to the 180-degree opposite side of clamp slot 12A according to the array of a printing drum, for example, so that it may press by five by the force of the non-contact-type external pressure additional equipmentF1, such as air blasting equipment and an electromagnet, and the direction of both resultant force F may be come to the 180-degree opposite side of clamp slot 12A from two peripheries of the drum body 12. And with such this operation gestalt, since the same effectiveness as \*\* of each of said operation gestalt - \*\* can be acquired and also the force can be made to act from the exterior of printing drum 10A, it is effective in not preparing a reaction force bar etc. in the interior of the drum body 12, structure becoming easy, and manufacture becoming easy.

[0034] Moreover, although considered as shock-mark prevention of printing drum 10A which contacts mutually, and 10A with said each operation gestalt, not only this but this invention may be applied also between printing drum 10A and 10B. In this case, what is necessary is just to constitute the press means of printing drum 10A so that the opposite side of a clamp slot can be pressed in case the slots of the duplex-printing drums 10A and 10B meet while forming said press means 2 or the same press means as 2' also in printing drum 10B and considering as the same structure as printing drum 10A.

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[Translation done.]

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] It is the general drawing showing the shock-mark arrester of the printing machine concerning the 1st operation gestalt of this invention.

[Drawing 2] It is an II-II line sectional view in drawing 1.

[Drawing 3] It is drawing showing the contact condition of the slots of the printing drum concerning a \*\*\*\* 1 operation gestalt.

[Drawing 4] It is the general drawing showing the shock-mark arrester of the printing machine concerning the 2nd operation gestalt of this invention.

[Drawing 5] It is a V-V line sectional view in drawing 4.

[Drawing 6] It is drawing showing the contact condition of the slots of the printing drum concerning a \*\*\*\* 2 operation gestalt.

[Drawing 7] It is drawing showing the shock-mark arrester of the printing machine concerning the deformation gestalt of this invention.

[Description of Notations]

1 1' Shock-mark arrester of a printing machine

2 2' Press means

9 Bearer

10 Printing Drum

11 Reaction Force Bar

12 Drum Body

12A Clamp slot

16 Cylinder

19 Hydraulic Pump

21 Servo Valve

24 24' Control unit

30 Magnetic Pole

31 Coil

32 Electric Wire

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[Translation done.]

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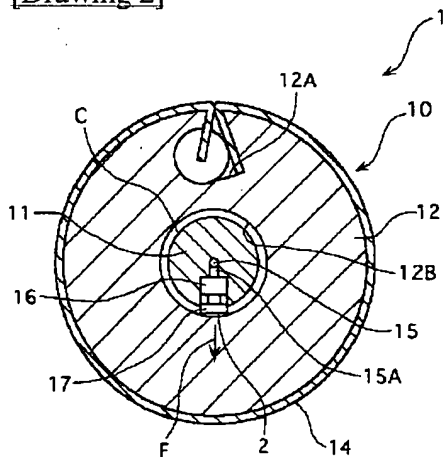
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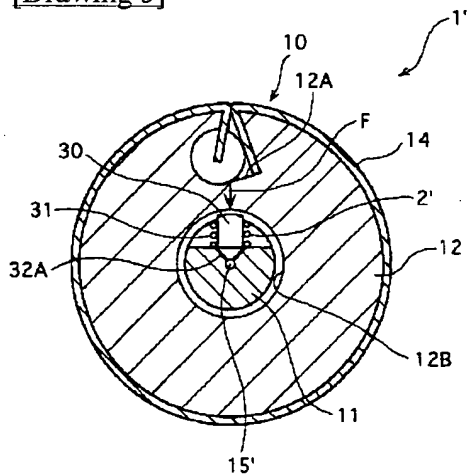
DRAWINGS

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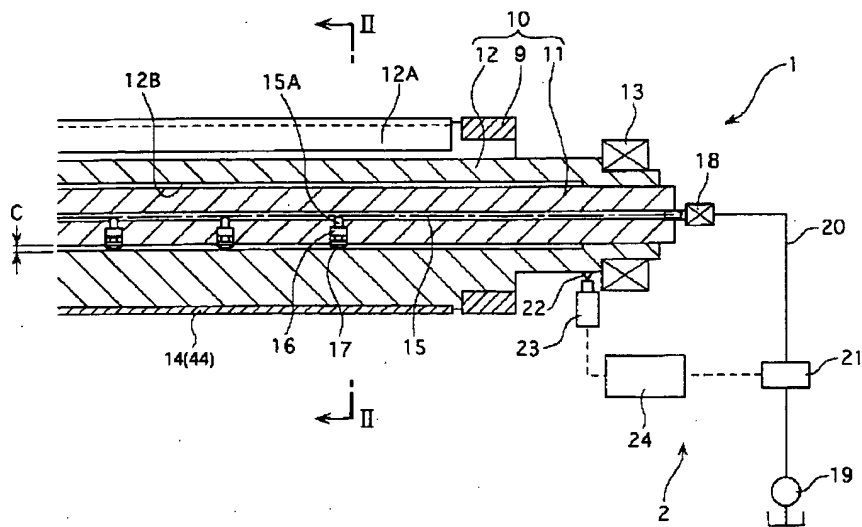
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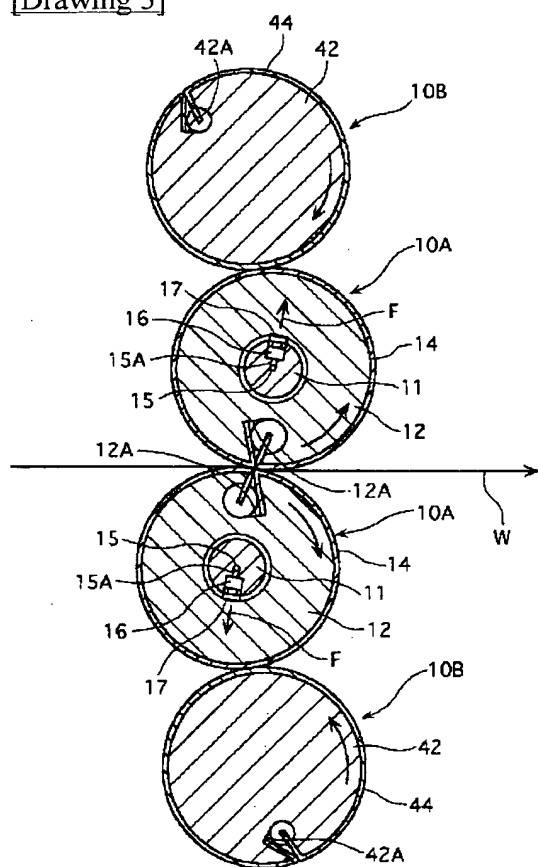
[Drawing 5]



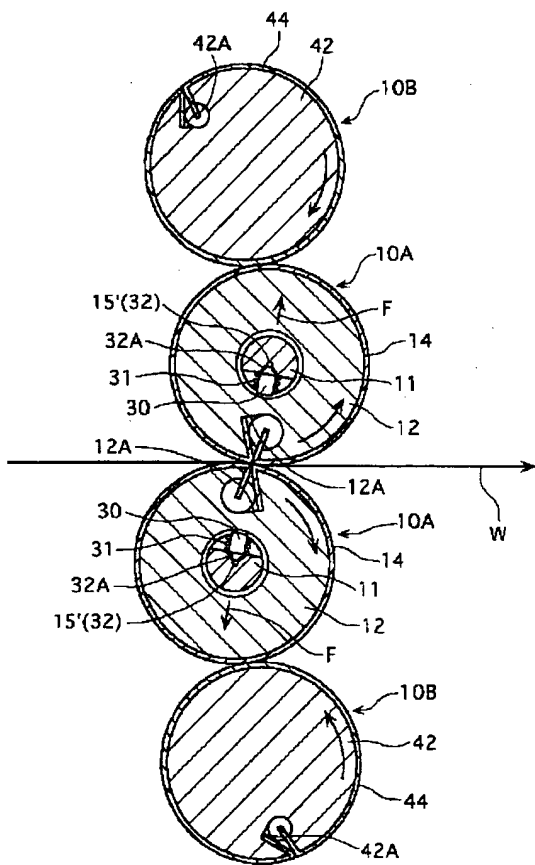
[Drawing 1]



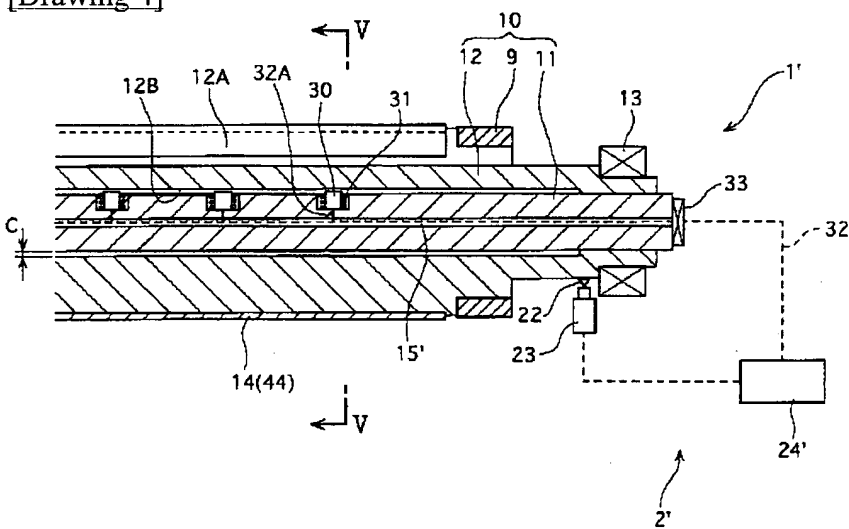
[Drawing 3]



[Drawing 6]

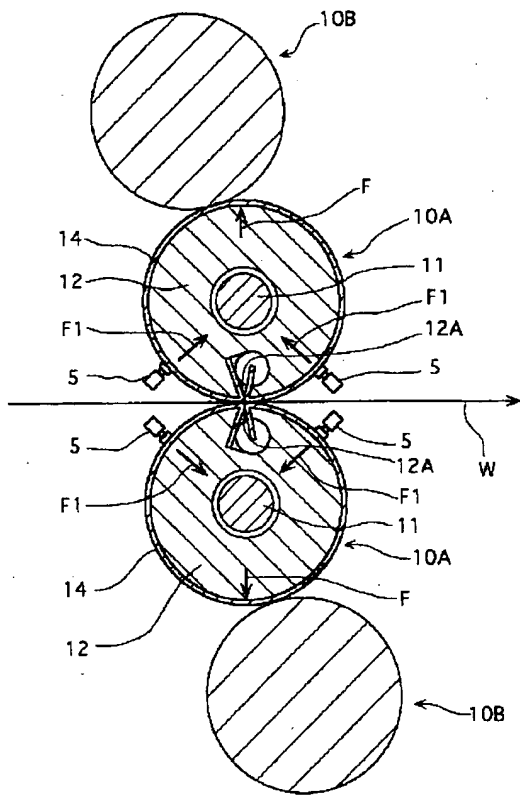


[Drawing 4]



[Drawing 7]






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[Translation done.]